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Diplodia Tip Blight of Two-Needled Pines

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Diplodia tip blight is one of the most visible diseases in the urban environment. It affects many common landscape pines in the Midwest, including Austrian (*Pinus nigra*), red (*P. resinosa*), mugo (mugho) (*P. mugo*), and Scots (Scotch) (*P. sylvestris*) pines. It also affects ponderosa (*P. ponderosa*) and Monterey (*P. radiata*) pines. The fungus commonly attacks mature trees that have been under stress from drought, root restriction or other planting site problems. It can also be a problem in young, rapidly growing nursery or Christmas tree plantings. This disease is found throughout the Great Plains, Midwest, Northeast, and California.

Symptoms and Signs

This disease is characterized by the blight, or dieback of the tips of branches that can be seen easily from a distance (Figs. 1 and 2). Repeated infections over several years can lead to the majority of the tree looking brown, entire branches dying, the tree becoming deformed. If left unchecked, it can eventually kill mature trees. Upon closer examination, one can find that often this disease begins on new shoots, turning the new needles brown before they are fully formed. It also can lead to resin being exuded from the infected new shoots. The infection may expand down the branch, but the pathogen can also infect older tissues directly through wounds caused by insect activity or hail. Older cones are also susceptible to the disease and often

support abundant fruiting on their scales. Occasionally, the fungus may form cankers on stems and branches of severely weakened trees.

A telltale way to determine if a tree is infected with Diplodia tip blight is to look for the signs of the pathogen, which consist of tiny black, fungal fruiting bodies



Figure 1. Typical tip blight symptoms on Austrian pine.



Figure 2. Tip dieback caused by *Diplodia pinea* infection.



Figure 3. Pycnidia (fungal fruiting bodies) produced on dead needles.

(pycnidia) that are formed on the surface of infected needles (Fig. 3) and infected cones (Fig. 4). These pycnidia are the source of the fungal spores that spread the disease.

Diplodia tip blight is the most common disease on two-needled pines. Outbreaks of the pine shoot moth and European pine sawfly may lead to similar diebacks, but these can be discerned by the presence of the attackers themselves, or evidence of their feeding activities.

Causal Fungus and Disease Development

Diplodia tip blight is caused by the fungal pathogen *Diplodia pinea* (also known as *Sphaeropsis sapinea*). Spores of the fungus develop in the black pycnidia located at the base of infected needles and other affected plant parts from

spring through fall. The fungus over winters in infected needles, bark, cones and needle litter beneath the tree.

During spring, the pycnidia produce spores that travel to newly emerging foliage during wet conditions. The spores are spread by wind-blown rain, rain splash, certain insects, and infected tools used in horticultural operations. The fungus penetrates through the stomata of new needles, which are highly susceptible at this stage, and proceeds to infect the shoot. It can spread from tree to tree anytime throughout the growing season under wet conditions. Infections often intensify within the same tree when it is exposed to water stress, particularly drought conditions. Developing cone scales are commonly infected, although they are not damaged.



Figure 4. Pycnidia (fungal fruiting bodies) produced on older cones.

Management

- Avoid planting susceptible pines in areas that are prone to cool and wet weather in the spring followed by drought or dry soil conditions during the rest of the year. An effort should be made to keep trees in good vigor with regular maintenance, deep watering during droughts, and control of insects. Fertilization of trees with mineral fertilizer (including “deep root feeding”) to increase vigor on sites with adequate fertility, i.e. over-fertilization, will likely make trees significantly more susceptible to the pathogen. If in doubt about the nutrient status of your soil, soil nutrient analysis by a reputable lab may be warranted. Building organic soil fertility with adequate mulching, especially with composted material, would be a better way to improve the long-term health status of at-risk trees than mineral fertilization.

- When producing pine seedlings in nurseries or trees in Christmas tree plantations, ensure that there are no nearby sources of inoculum, e.g. older, infected pines in nearby windbreaks.
- Pruning of infected branches on lightly diseased trees can be an effective control measure by making the cut at least two feet below visible symptoms and if there are no infected trees nearby. Pruning should be conducted only as needed, and tools should be disinfected, e.g. with bleach or alcohol, between cuts. Pruning should be followed by sanitation (removal and destruction of infected needles and cones) to help lower the disease pressure.
- Tip blight can be partially controlled with fungicides. New spring growth must be protected from bud swell to full candle elongation. Make the first application just prior to bud break and make two additional applications at 10-day intervals. It is important to get the first application on the trees before any bud sheaths have broken. For high value trees, commercial formulations of common fungicides, such as thiophanate methyl (e.g. Cleary's 3336, OHP 6672), propiconazole (e.g. Banner MAXX), azoxystrobin (Heritage), and others registered for use on Diplodia blight are available for application by professional arborists and landscapers. However, if bud sheaths have broken, spraying with fungicides is highly unlikely to result in control of the disease.

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